

# PROJECT PROFILE

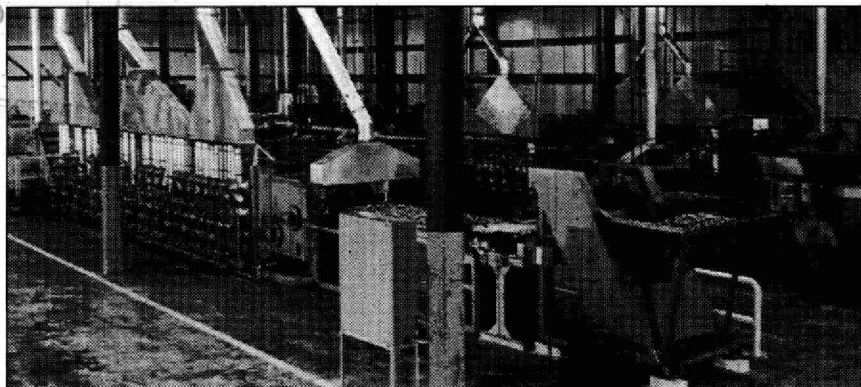
## TECHNOLOGY APPLICATION



# Continuous Mesh Belt Heat Treating Furnace

“At a critical time in the recent recession, the participation of the Ontario Ministry of Environment and Energy was extremely helpful to B&W Heat Treating in sharing the risk of introducing new, effective technology.”

Dr. Clare Beingessner  
Vice President for Technology  
B&W Heat Treating (1975) Ltd.  
Kitchener, Ontario



Gas-Fired High-Efficiency Mesh Belt Carburizing Furnace at B&W's Trillium Park plant, Kitchener

### CHALLENGE

The challenge for B&W was to improve its productivity, its product and ultimately its competitive edge in the heat treating business.

Carburizing and carbonitriding to case depths in the range 0.5 to 0.7 millimetres (mm) has traditionally been performed in batch-type, controlled atmosphere furnaces. This type of furnace has two drawbacks. First, it does not use energy efficiently because of the relatively low net weight of the parts processed in each furnace charge. The reason for this is that the parts being treated must be loaded into baskets and/or fixtures which are then placed on special furnace trays. Second, the labor costs are significant because to reduce distortion in the quenching process, the parts must be placed on racks. Replacing batch type furnaces with energy efficient continuous mesh belt carburizing furnaces would result in substantial savings in energy and labor.

### TECHNOLOGY

B&W has installed a gas-fired, high-efficiency mesh belt carburizing furnace in its Trillium Park plant. This furnace has several new energy saving features. Older furnaces were heated with both gas and electricity and had standard alloy radiant tubes and insulation. The new all gas-fired

furnace makes use of a special backup insulation and refractory wash to reduce the amount of furnace heat loss. Further, rapid heat-up rates are possible with this furnace because it uses a new single-end, recuperated (SER) radiant tube design which employs horizontal ceramic firing tubes. Finally, the new computerized weighing system loads parts onto the furnace belt consistently and uniformly.

The new furnace has one-half inch thick Microtherm backup insulation. This material which was developed in Europe is being introduced into Canada with this furnace. This refractory backup insulation means that without increasing the overall size of the furnace, less heat is lost through the furnace shell.

A special refractory wash which has been applied to the hot side of the insulating firebricks reduces the diffusion of furnace gases into the bricks.

The new furnace was designed by CAN-ENG Sales (1985) Ltd. of Niagara Falls, Ont. The new horizontal ceramic SER firing tube system was designed by Pyronics Inc. Hi-Tech Weighing Systems of Niagara Falls, Ont. designed the new computerized weighing system which was incorporated into an Oakland step ram feeder.

### RESULTS

The new mesh belt carburizing furnace has been in operation since the fall of 1992 and has demonstrated that it uses energy efficiently. Results of tests using infrared analysis showed that the temperature of the new furnace's exterior shell was about 22°F cooler than that of the older design. This energy savings alone amounts to about 22,000 British thermal units (BTU) per hour. Other results are just as impressive.

- 1) Heat-up studies have shown that the new firing system will allow parts to come to heat closer to the entrance of the furnace. That means higher production rates are possible.
- 2) Comparative energy studies have shown that heat treating in the new furnace costs 32 percent less than the batch furnaces and 77 percent less than the older design mesh belt furnace.
- 3) Dimensional and metallurgical results from the new furnace have shown a dramatic improvement over those achieved with batch furnaces.

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The company will know after several years whether or not the life span of the horizontal ceramic firing tubes is equal to or exceeds the lifespan of metal alloy tubes.

## BENEFITS

The benefits of using mesh belt carburizing furnaces include:

- \* savings in energy and maintenance;
- \* increase in production capacity;
- \* improvements in the workplace environment;
- \* a significant improvement in metallurgical properties and dimensional tolerances.

The projected annual savings are estimated at more than \$200,000 a year with a simple payback of 3.3 years.

## PARTNERSHIP IN POLLUTION PREVENTION AND RESOURCE CONSERVATION

Industrial companies located in Ontario may participate in ministry/industry programs that will help them to:

- \* use energy and water more efficiently;
- \* reduce, reuse and recycle solid waste;
- \* reduce or eliminate liquid effluent and gaseous emissions.

Equipment and services supply companies can benefit from the information provided on technologies identified for business development.

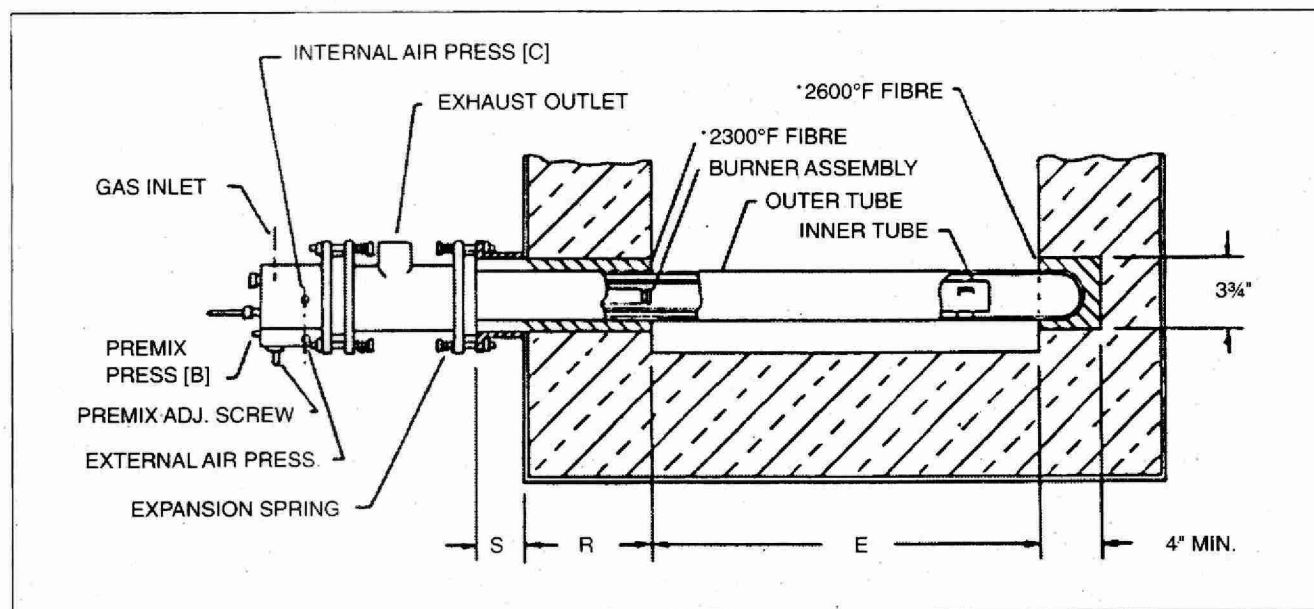
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## MINISTRY OF ENVIRONMENT AND ENERGY PROGRAMS

For information on Ministry of Environment and Energy assistance to industry, please contact the Industry Conservation Branch at (416) 327-1492, Fax (416) 327-1261



*Horizontal High Performance Single End Recuperated Radiant Tube design*

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